Family Radio Service on The Air!

No Test, No License and Plenty of Radio Fun

By Gordon West

There is BIG excitement over a little radio the size of a deck of cards. They have one-half watt output on UHF, narrow-band FM, 14 channels, phased lock loop synthesis, and full squelch, plus continuous tone coded squelch system (CTCSS). Minimum range within steel buildings is about 3,000 feet. Mountain top point-to-point range is greater than 80 miles! No license is required; there's no theory or code test. Welcome to the Family Radio Service!

Family Radio Service, abbreviated "FRS," is authorized by the Federal Communications Commission under Part 95, Subpart B, FRS Rule 3, Part 95.193 which says:

(A) You may use an FRS unit to conduct two-way voice communications with another person. You may use the FRS unit to transmit one-way communications only to establish communications with another person, send an emergency message, provide traveler assistance, make a voice page, or conduct a brief test.

The rules also indicate that tone signaling is perfectly acceptable, phone patch to interconnect to the public-switched network is not acceptable. Also noted is authorization to operate anywhere in the 50 United States and its territories, with no specific rules on what you can and cannot say over the airwaves, other than you can't use your little FRS unit to conduct any activity which is against federal, state, or local laws.

Is It Like CB?

Sounds a bit like Citizens Band? Actually, the Family Radio Service falls under the same Part 95 Personal Radio Services that the common Citizens Band is also under. And if you think about it, 40 years ago there was a Class A Citizens Band on UHF frequency pairs 462.xxx MHz/467.xxx MHz; the rules back then were much like the new rules today for Family Radio Service.

The whole idea of a short-range, no-license, no-skip, UHF Family Radio Service was developed by RadioShack's Robert Miller, K2RM. Miller saw the need for a multi-channel synthesized handheld with a minimum of one-half mile range to keep people in touch. Miller, an active ham radio operator, was looking for a radio service that would fulfill the requirements of family members and friends to stay in touch without having to pass a ham test, or without having to fill out complicated FCC licensing forms. Miller suggested frequencies that would straddle the already-in-place General Mobile Radio Service channels.

Motorola drew big crowds to their booth during FRS demonstrations.

These 8-plus-8 GMRS frequencies are authorized under FCC Part 95.29 for repeater and "talk-around" communications by licensed GMRS users. The General Mobile Radio Service is an offshoot of that original 40-plus year-old Class A CB radio service on UHF. GMRS is a no-nonsense, well-disciplined, radio service

GMRS Frequencies

Base Station, Mobile Relay Station, Fixed Station, or Mobile Station	Mobile Station, Control Station, or Fixed Station Operated in the Duplex Mode
CH 1 – 462.550 MHz	CH 1 – 467.550 MHz
CH 2 – 462.575 MHz	CH 2 – 467.575 MHz
CH 3 – 462.600 MHz	CH 3 – 467.600 MHz
CH 4 – 462.625 MHz	CH 4 – 467.625 MHz
CH 5 – 462.650 MHz	CH 5 – 467.650 MHz
CH 6 – 462.675 MHz	CH 6 – 467.675 MHz
CH 7 – 462.700 MHz	CH 7 – 467.700 MHz

FRS equipment transmits one-half watt on UHF simplex frequencies, +/- 3 kHz deviation FM. (Courtesy Alinco)

Motorola's TalkAbout two-way FRS radios are designed specifically for active families. (Courtesy Motorola)

serving thousands of professional radio operators and REACT units throughout the USA. The well-disciplined GMRS service is guided by the Personal Radio Steering Group, Inc., P.O. Box 2851, Ann Arbor, Michigan 48106, phone 313-MOBILE-3 (313-662-4533). The PRSG deserves much credit in keeping a radio service, created by the Federal Communications Commission, orderly and useful, and always on track by advice from their regular newsletter. Call or write the PRSG for more details if you're looking for a well-run repeater radio system for personal communications.

Family Radio Service communications operate *simplex only*, not through repeaters like GMRS. But as you can see by the frequency allocations, the Family Radio Service simplex communications stagger GMRS repeater output frequencies and mobile input frequencies. The FRS "interstitial" channels also duplicate seven simplex frequencies granted to GMRS low-power base stations and portable stations. The new Family Radio Service 14 UHF channels are sandwiched in between licensed users on GMRS frequencies.

The little Family Radio Service transceivers operate the same type of frequency modulation as GMRS units on these frequencies, but FRS equipment is limited to one-half watt output. FRS equipment also runs tighter deviation at 3 kHz. If there is a GMRS user on one of these frequencies running 5 watts at 5 kHz, they will definitely command the channel.

Since most Family Radio Service equipment is synthesized for all 14 channels of operation, things will undoubtedly be quieter on FRS Channels 8 through 14. But what is good for FRS unit-to-unit communications on Channels 8 through 14 may not necessarily be good to GMRS repeater inputs which straddle these higher FRS channels.

"Tests showed an alarming problem with a FRS radio with CTCSS when operated on a frequency adjacent to a GMRS repeater input, using the same tone," comments Bob Leef, well-known communications expert and member of REACT. "The repeater gets activated, and although voice was not always passed, the interference takes the form of repeater keying where licensed GMRS users must put up with the sound of repeater 'kerchunking'. This is a serious condition when the repeater was FRS-activated at seven miles from the site, and another at over 13 miles away from its site," comments Leef. "We hope people using FRS equipment will STAY OFF Channels 8 through 14," added Leef.

He raises a good point for FRS users to stay off of the higher channels when operating in commercial areas near potential GMRS repeater sites. It would also help to not necessarily run tone-coded squelch on transmit unless absolutely necessary in order to protect licensed adjacent-channel GMRS repeaters.

A Look at FRS Equipment

Family Radio Service equipment is readily available in the $149 per unit price bracket. You can spend less, but you may only get five or six channels. You can spend more and get all of the options. And no doubt, you will recognize many of the brand names: Motorola, RadioShack, Midland, Standard, Kenwood, Alinco, Maxon, and Cobra.

Almost all of these sets put out the maximum limit of one-half watt into their built-in antenna. Antennas are not allowed to be removable, and you are not allowed to extend your range by going to a bigger outside antenna system. All units operate frequency modulation (FM), 3 kHz deviation, and most also offer quiet channel monitoring using sub-audible tone decode.

The little Family Radio Service equipment will run about a day on internal alkaline "AA" or "AAA" batteries. Most also feature a battery-saving circuit which minimizes current when there is no one

FRS Channels

FRS Channel 1 – 462.5625 MHz	FRS Channel 8 – 467.5625 MHz
FRS Channel 2 – 462.5875 MHz	FRS Channel 9 – 467.5875 MHz
FRS Channel 3 – 462.6125 MHz	FRS Channel 10 – 467.6125 MHz
FRS Channel 4 – 462.6375 MHz	FRS Channel 11 – 467.6375 MHz
FRS Channel 5 – 462.6625 MHz	FRS Channel 12 – 467.6625 MHz
FRS Channel 6 – 462.6875 MHz	FRS Channel 13 – 467.6875 MHz
FRS Channel 7 – 462.7125 MHz	FRS Channel 14 – 467.7125 MHz

Shared GMRS/FRS Frequencies

462.5625 MHz	462.6625 MHz
462.5875 MHz	462.6875 MHz
462.6125 MHz	462.7125 MHz
462.6375 MHz	

coming through your squelched channel.

Typical range in a residential neighborhood is about one mile between FRS units. Inside shopping malls, range may drop down to 300 yards, but out in the open, one-half watt on 462 MHz, 467 MHz channels goes line-of-sight plus about 20 percent from refraction over snow, ice, and water. It's not unusual for a family to stay in touch from an open fishing skiff back to base camp over five to seven miles. This is generally a lot better than what you could do with a pair of five-watt, Class D, 27 MHz, CB walkie-talkies, and it's a lot further than what you could ever expect with a pair of 49 MHz low-power handhelds.

When it comes to maximum range, the record is well over 100 miles between a pair of FRS units from one mountain top to another on a line-of-sight basis. I expect to see radio hobbyists try to punch through 200 miles on a hot summer afternoon, taking advantage of tropospheric ducting. One-half watt goes a heck of a long way!

The new Kenwood 14-channel FRS transceiver. (Courtesy Kenwood)

FRS is a great way to stay in touch at conventions. (Photo by Gordon West)

Some Family Radio Service operators have turned their little handhelds into quasi-repeater stations. They use voice-activated transmit circuits, and create their own input and output portable repeater system.

There are also digital store-and-forward simplex "repeaters" that will listen for 30 seconds, and then digitize the conversation back out on the same frequency. There have also been attempts to inductively couple external antennas onto the little rubber antenna—and as long as you don't make a direct connection, this method could possibly extend your range if you can do it just right. But remember, going into the actual antenna circuit on an FRS unit would not be allowed.

The intent of the FRS is a family radio service where mom and dad can chat, and still keep track of the kids out on the lake, or in that big shopping mall. FRS can satisfy the needs of small shop owners that may need to communicate from the front room to a warehouse next door. FRS is a great way to stay in touch when visiting a theme park, or a huge shopping mall where kids might get separated from the rest of the party.

It's thought that FRS will soon be one of the hottest hobby bands around for those operators wanting a taste of no-license radio, and an introduction on what they might do with more powerful equipment if they were to obtain their amateur radio ticket or realize the capabilities of other commercial radio services. FRS is hopefully not going to turn into whistles, hoots, and howls that presently create chaos on Class D Citizens Band. Since FRS base stations are not allowed on an outside antenna, it's doubtful it will appeal to those type of operators. However, to the radio hobbyist wanting to break a new long-range record on UHF, FRS is a fun way to get started out on the airwaves.■

The Midland 75-510 14-channel FRS transceiver has many features including auto power save. (Courtesy Midland International)